

REMARKS:

- 1) Referring first to the "Office Action Summary" (PTOL-326), applicants appreciate the indication of allowable subject matter in claim 4. However, the prior art is not justifying the inclusion of claim 4 into an independent claim as will be explained in more detail below.
- 2) With regard to the objection to the drawings that the features of original claim 11 are not illustrated, claim 11 has been amended to make it clear that it is only the upper sheet metal end portion that comprises the recess 20 for receiving the rivet head. The recess 20 is illustrated in present Fig. 7. Therefore an amendment of the drawings is not necessary. Withdrawal of the objection to the drawings is respectfully requested.
- 3) The Examiner is respectfully requested to acknowledge the receipt of the priority document and the claim to the priority of the corresponding German Patent Application DE 102 38 820.2 which was filed with the present application with the USPTO. A copy of the postcard acknowledging the receipt of the present application and of the priority document on August 25, 2003 is enclosed.
- 4) Referring to sections 1, 2 and 3 on page 3 of the Office Action, the term "Hi Lok" has been avoided in amended claim 10. Therefore withdrawal of the rejection under 35 U.S.C. §112 second paragraph of claim 10 is respectfully requested.
- 5) Referring to sections 4 and 5 on pages 3 and 4 of the Office Action, the rejection of claims 1 and 12 under 35 U.S.C. §102(b) in view of US Patent 5,297,760 (Hart-Smith) is respectfully traversed.

- 6) As disclosed in the present specification at the bottom of page 3 and at the top of page 4 it is the purpose of the invention to prevent or at least reduce the formation of cracks and the crack spreading to thereby provide a splice connection with an improved crack progression characteristic by reducing the stress on conventional rows of rivets.
- 7) The invention solves this problem by intentionally providing a gap that permits play between each rivet shaft of a further row (7) of rivets and any one of the first and second end portions of the sheet metal layers to be riveted together. This gap is shown in the present drawings for example at 11 and 12 in Fig. 4, at 11 in Fig. 5 and at 15 in Fig. 7. In the embodiment of Fig. 4 the rivet shaft is so formed that the gap 11, 12 extends between the top portion of the rivet shaft and the top sheet to be riveted. The gap also extends slightly between the lower end of the rivet shaft and the lower sheet metal layer 3.
- 8) The surprising effect of the intentionally provided gap in the further row (7) of rivets according to the invention is seen in that the gap prevents or minimizes the formation of peak stress cracks in the sheet metal layers particularly in the top sheet metal layer with the beneficial results that cracks even if they should occur propagate more slowly than in conventional rivet splices. Such a feature is not disclosed by Hart-Smith. Therefore Hart-Smith does not anticipate claim 1 as amended and the claims remaining dependent under claim 1. The core of Hart-Smith is precisely described in the middle of page 4 of the Office Action in which indeed the "lollipop fingers soften the load transfer". While it is probably true, without being

admitted by the applicants that the connected parts of Hart-Smith move relative to one another, this motion is permitted due to the enhanced elasticity and resulting flexibility of the lollipopped fingers thereby in fact preventing the formation of a gap between the rivet shaft and the internal wall of the rivet holes. It follows, that Hart-Smith solves the problem in an entirely different way namely by the elasticity and flexibility of the "lollipopped fingers".

- 9) Referring to section 8 on page 5 of the Office Action, US Patent 2,746,579 (Gondek) clearly supports the applicants position that the tendency for the connecting elements to shear or for the holes accommodating the connecting elements to become enlarged is the cause for the formation of cracks that start with the enlargement of the rivet holes due to wear and tear and due to the shear forces effective on the rivet shafts. It is respectfully submitted that the conclusion set forth at the end of section 8 of the Office Action is in error. Hart-Smith in fact avoids the formation of hole enlargements by permitting the sheet metal layers to move parallel to each other due to the elasticity and flexibility of the lollipopped fingers. Contrary thereto the invention teaches to provide the gap around the rivet shaft and between the rivet shaft and the rivet hole or holes for the purpose of permitting a slight relative movement of the connected sheet metal members relative to each other without introducing shear stress into the rivet shaft. The claimed gaps have the opposite effect of gaps formed by wear and tear. The latter cause cracks, the former prevent cracks.
- 10) With regard to claim 12 which has now been amended to define that the first and second end portion edges, the fatigue critical row

(6) of rivets and the further row (7) of rivets extend parallel to one another. The end edges in Hart-Smith cannot extend in parallel to each other because the lollipopped fingers do not provide a straight edged contour.

- 11) In view of the foregoing the rejection of claims 1 and 12 under 35 U.S.C. §102(b) is respectfully traversed and allowance of claims 1 and 2 is requested.
- 12) The rejection of claims 2, 3, 5, 6, 7, 8, 9 and 11 under 35 U.S.C. §103(a) in view of Hart-Smith taken in the light of US Patent 4,394,096 (Stevens) is respectfully traversed.
- 13) With regard to claim 2, the feature must not be overlooked that the present rivet connection must provide a positive interlocking force to cause friction in the overlapping contact area. The liner attachment system of Stevens actually wants to avoid friction between the contacting surfaces of the liner 1 and the metal substrate 2. Stevens goes so far as to provide an opening 12 that is substantially oversized or larger than the shank 5 to allow relative lateral movement of the bolt 3 and liner 1 with respect to the substrate 2 to accommodate linear expansion and contraction of the liner 1, please see col. 3, lines 27 to 32 of Stevens. Stevens further discloses that he uses a plastic washer 13 to enhance the relative lateral movement of the liner 1 thus minimizing friction. Stevens further uses a circular mounting rim 9 that extends partially under the head 4 to trap the bolt and hold it against vertical movement although it is preferred to provide relative rotational movement about the axis of the shank 5. The just mentioned features in the Stevens disclosure show expressly that friction between the liner and the substrate is

to be avoided. On the other hand the riveting of an aircraft skin as disclosed by Hart-Smith, requires the formation of friction to assure a solid connection between two sheet metal sections by the lap splice. For that very reason Hart-Smith would not use a construction as disclosed by Stevens the remarks in section 14 on page 6 of the Office Action notwithstanding. A person of ordinary skill does not use features that would defeat solving the problem at hand, namely crack formation and propagation.

- 14) With regard to the rejection of claims 3 and 9, the above remarks regarding Stevens apply equally. As correctly stated in section 15 on page 6 of the Office Action, the gap 12 is intended to allow relative lateral movement of the liner and the substrate 2. This express purpose of the Stevens disclosure does not make any suggestion that such a gap as shown at 12 by Stevens would reduce or even prevent the formation of cracks that conventionally tend to occur and start at the edges of rivet holes and propagate from these rivet hole edges into the interconnected or spliced sheet metal layers. Here again those skilled in the art of aircraft construction, would consider the elastic connection provided by Stevens as unsuitable for the purposes of splicing aircraft skin sections to each other.
- 15) With regard to the remarks in section 17 on page 7 of the Office Action regarding claims 5 and 6, nothing is mentioned in col. 3, lines 19 to 26 of the Stevens disclosure regarding a "press fit between the first shaft diameter 6) and the wall of the rivet hole". A press fit is conventionally formed between a hole having a circular cross section in one member to be connected and a circular cross section in a shaft to be press fitted into that

hole. Since the liner 1 of Stevens is elastic a press fit cannot be formed between a round hole in the liner 1 and a circular cross section in the shaft. This statement is expressly supported by Stevens disclosure that the shaft has a squared portion 6 that deforms the opening in the liner into a non-circular configuration thus providing a non-rotatable engagement between the bolt 3 and the liner 1. Such a connection is unsuitable for the splicing of aircrafts skin sections. Therefore a person of ordinary skill in the art of splicing sheet metal sections, would not even consider using the "attachment system" of Stevens in a riveted connection.

- 16) With regard to claim 7 an independent protection for a rivet with a shoulder is not intended.
- 17) Claim 8 has been amended to clearly express that the clamping force must provide friction in the splice when the rivet is set. Stevens actually does not want a frictional force between the liner 1 and the substrate 3.
- 18) Regarding sections 20 and 21 on page 7 of the Office Action, present claim 11 includes all the features of amended claim 1 and therefore is patentably distinguished over the disclosures of Hart-Smith and Stevens taken in combination for the reasons stated above. The recess 20 according to the invention is provided for aerodynamic reasons and not for any of the reasons set forth in section 21 on page 7 of the Office Action.

- 19) Summarizing, the expressly disclosed elastic features provided by Stevens, would militate against combining the Stevens disclosure with the Hart-Smith disclosure because the features of the Stevens liner connection are unsuitable for a splice in an aircraft skin for example.
- 20) Withdrawal of the rejection of claims 2, 3, 5, 6, 7, 8, 9 and 11 under 35 U.S.C. §103(a) is respectfully requested.
- 21) Claim 13 has been added to expressly cover the embodiment of Figs. 5, 6 and 7 wherein the play providing gap is positioned between the rivet shaft and the upper end portion of the sheet metal members. Claim 13 is also supported in the specification at page 12 lines 3 to 5. Therefore, new matter is not involved in added claim 13 nor in any of the other amendments.
- 22) Favorable reconsideration and allowance of the application, including all present claims 1 to 13, are respectfully requested.

Respectfully submitted,
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